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Spawning Frequency and Fecundity of Blue Tilapia

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GENERAL NOTES

SPAWNING FREQUENCY AND FECUNDITY OF BLUE TILAPIA

Blue tilapia, *Tilapia aurea,* are becoming increasingly popular as commercial culture fish in Arkansas. Tilapia have a variety of aquaculture applications. They can be used to control rooted aquatic vegetation and filamentous algae, raised for sale as baitfish or to provide forage for channel catfish brood stock, largemouth bass or striped bass. In addition, polyculture of blue tilapia and channel catfish may result in a reduced incidence of off-flavor in channel catfish (Torrans and Lowell, Proc. Ark. Acad. Sci. 41:82-86, 1987).

Blue tilapia are also excellent food fish, however, the growing season in central Arkansas may be too short to grow them to market size in a single season (Torrans and Lowell, Proc. Annu. Conf. Southeast Assoc. Fish and Wildl. Agencies, 40:187-193, 1986). Early spawning of tilapia in a heated indoor hatchery may extend the growing season long enough to solve this problem. The purpose of this study was to determine the spawning frequency and fecundity of blue tilapia spawned in indoor facilities.

Twenty sexually mature pair of blue tilapia were placed in individual 36"-diameter circular tanks on July 15, 1982. The females ranged in weight from 22 g to 138 g and the males from 50 g to 178 g. The upper lip (maxillary and premaxillary bones) was surgically removed from the males prior to the study to reduce agressive behavior toward the females. The fish were fed daily to satiation with a 32% protein floating feed.

The tanks were continuously supplied with outdoor pond water at ambient temperature, and the water temperature was monitored beginning the third week of the study with a recording thermometer. A 6" piece of 4" diameter PVC pipe was placed on the bottom of each tank to provide a refuge for the female. Spawning substrates, such as sand or gravel, were not added to the tanks.

The fish were examined at weekly intervals for 15 weeks. Females that had spawned and were mouthbrooding eggs were removed with a fine mesh dip net and weighed to the nearest gram. The eggs were removed from the buccal cavity for later counting, and the females were immediately returned to their respective tanks.

The 20 pair of tilapia spawned a total of 48 times during the study. Five females did not spawn, three spawned once, three spawned twice, three spawned three times, one spawned four times, four spawned five times, and one spawned six times. Twenty-three of the 33 repeat spawns came within two weeks of the previous spawn. There was not a significant correlation between female weight and spawning frequency ($r = -0.25$, $N = 20$), nor between the male/female weight ratios and spawning frequency ($r = 0.15$, $N = 20$).

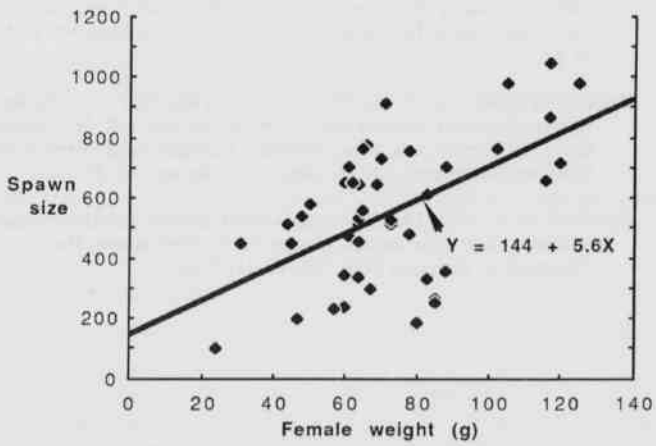

Figure 1. Spawn size (number of eggs) of female blue tilapia. The calculated regression line is shown.

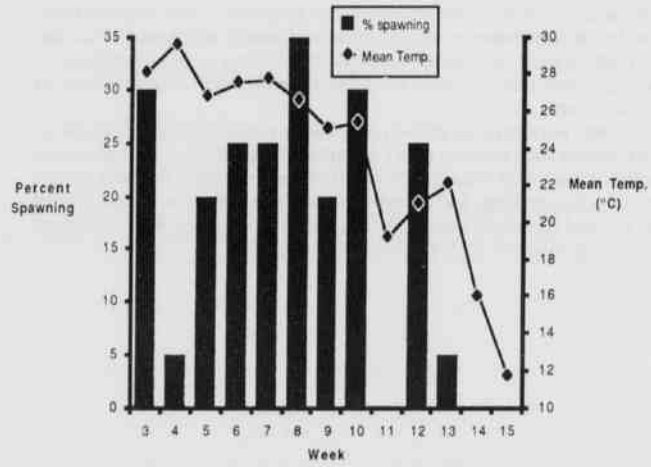

Figure 2. Percentage of 20 female tilapia spawning each week (solid bars) and the mean weekly water temperature (line). Data are not shown for weeks 1-2, since the temperature was not recorded during this period.

The spawns ranged in size from 97 eggs from a 24 g female, to 1042 eggs from a 117 g female (Figure 1). While there was a highly significant positive correlation between female weight and spawn size ($r = 0.55$, $P < 0.01$, $N = 48$), there was considerable variation in the size of the spawns produced by individual females. One female, for example, produced consecutive spawns of 178 and 479 eggs. The reason for this variation is unknown. There was no clear tendency for successive spawns to be larger, nor was there a significant correlation between the spawn size and the time period since the last spawn.

Only one fish spawned during week 4 (Figure 2), when the highest temperature of the study was recorded (29.6 °C). This may indicate an upper temperature threshold for spawning. Within the temperature range of 25 °C to 28 °C, 20% to 35% of the females spawned each week. Spawning ceased in late September and early October (weeks 11, 14 and 15) when the weekly water temperature averaged 19.4 °C or less. The lowest weekly water temperature at which fish spawned during this study was 21.1 °C. This was one degree lower than the lower temperature threshold previously determined for pond spawning in the spring, when the water temperature was rising (Torrans and Lowell, Ark. Farm Research, 34[1]:3, 1985).

Indoor production of tilapia fry is possible. Tilapia will spawn readily in confinement within the optimum temperature range of 25 °C to 28 °C. Female tilapia can spawn in intervals as short as two weeks if they are not allowed to incubate the eggs. Eleven kg (twenty-five pounds) of female tilapia could produce over 20,000 fry per week on a continuing basis, assuming a 25% weekly spawning rate. The spawning rate, and thus total weekly egg production, could be increased if non-spawning females were identified and replaced.

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